

We claim:

1. An airbag system comprising:
  - an airbag housing;
  - an airbag mounted to the airbag housing, and having an occupant facing portion which, when the airbag is inflated, faces an occupant position;
  - a source of gas mounted to the airbag housing in gas supplying connection to the airbag to cause the airbag to inflate when a flow of gas is initiated;
  - a sensor for detecting a vehicle occupant, the sensor being mounted to the occupant facing portion of the airbag, so that when the airbag is deployed the sensor moves with the airbag toward the occupant; and
  - a controller in electrical signal receiving relation to the sensor to detect the sensor interaction with a vehicle occupant.
2. The airbag system of claim 1 wherein the sensor comprises a conductive area of the occupant facing portion of the airbag.
3. The airbag system of claim 1 wherein the sensor comprises a Capaciflector sensor.
4. The airbag system of claim 1 further comprising electrical traces formed on a surface of the airbag, wherein electrical signals from the sensor are conducted along the electrical traces.
5. The airbag system of claim 1 wherein the controller in electrical signal receiving relation to the sensor is connected in controlling relation to a vent mounted to the airbag housing, the vent being operable in response to a command from the controller to allow an escape of gas from the airbag.

6. The airbag system of claim 5 further comprising a means for detecting at least one stage of airbag inflation, and operatively connected to the vent, to inhibit opening of the vent when the at least one stage of airbag inflation is detected.

7. The airbag system of claim 6 wherein the means for detecting at least one stage of the airbag inflation is a wire connected to the occupant facing portion of the airbag.

8. The airbag system of claim 2 further comprising an electrical contact forming part of a vehicle seat, the electrical contact and the sensor comprising the conductive area being connected to an electrical circuit which provides an output when both the electrical contact forming part of the vehicle seat and the sensor comprising the conductive area are electrically connected by a vehicle passenger.

9. An airbag system comprising:

- an airbag housing;
- an airbag mounted to the airbag housing, and having an occupant facing portion which, when the airbag is inflated, faces an occupant position;
- a source of gas mounted to the airbag housing in gas supplying connection to the airbag to cause the airbag to inflate when a flow of gas is initiated;
- an electromagnetic wave transmitter fixedly mounted with respect to the airbag housing;
- an electromagnetic wave receiver fixedly mounted with respect to the airbag housing;
- a reflector mounted to the occupant facing portion of the airbag so that when electromagnetic waves are transmitted by the transmitter toward the reflector, the electromagnetic waves are reflected toward the receiver; and

a controller operably connected to the transmitter and receiver to calculate at least one displacement derivative with respect to the reflector.

10. The airbag system of claim 9 wherein the reflector comprises a conductive area of the occupant facing portion of the airbag.

11. The airbag system of claim 9 wherein the reflector is a passive reflector.

12. The airbag system of claim 9 wherein the controller is connected in controlling relation to a vent mounted to the airbag housing and operable, in response to a command from the controller, to allow an escape of gas from the airbag.

13. The airbag system of claim 12 further comprising a means for detecting at least one stage of airbag inflation, and operatively connected to the vent to inhibit opening of the vent when the at least one stage of airbag inflation is detected.

14. The airbag system of claim 13 wherein the means for detecting at least one stage of the airbag inflation is a wire connected to the occupant facing portion of the airbag.

15. A method of controlling deployment of an airbag which is deployed toward a vehicle occupant, the method comprising the steps of:

initiating the deployment of an airbag toward a vehicle occupant; and  
while the airbag is deploying, determining the distance between a portion of the airbag which faces a vehicle occupant and the vehicle occupant with a sensor mounted on the portion of the airbag which faces the vehicle occupant.

16. The method of claim 15 wherein the step of determining the distance between a portion of the airbag which faces a vehicle occupant and the vehicle occupant with a sensor mounted on the portion of the airbag which faces the vehicle, is repeated a multiplicity of times.

17. The method of claim 16 wherein at least one derivative of distance with respect to time of the distance between the portion of the airbag and the vehicle occupant is determined.

18. The method of claim 17 wherein a controller in data receiving relation with the sensor is used to process data from the sensor and calculate the at least one derivative of distance with respect to time of the distance between the portion of the airbag and the vehicle occupant; and further comprising the step of controlling a vent connected to the airbag with the controller, to open the vent if the airbag is predicted by the controller to impact the vehicle occupant before it has reached a selected percentage of full deployment.

19. The method of claim 18 further comprising the step of monitoring whether the airbag has reached the selected percentage of full deployment, and on condition that the selected percentage of full deployment has been achieved, inhibiting the opening of the vent.

20. The method of claim 15 wherein the sensor mounted on the portion of the airbag facing the vehicle occupant is a capacitor, and wherein the step of determining the distance between the portion of the airbag which faces a vehicle occupant and the vehicle occupant is performed by determining an electrical value associated with the capacitor.